

# **23<sup>rd</sup> Congress of Chemists and Technologists of Macedonia**

## **BOOK of ABSTRACTS**



8-11 October 2014  
Ohrid, Republic of Macedonia



Сојуз на хемичарите и технолозите на  
Македонија

Society of Chemists and Technologists of Macedonia

**XXIII Congress**  
with international participation

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- EN 012** Kaltrina Jusufi, Majlinda Vasjari, Trajče Stafilov, Bardha Korça, Mentor Ismajli  
Distribution of As, Cr, Ni and V in agricultural soils near Kosova's power plant
- EN 013** Biljana Dimkova, Trajče Stafilov, Robert Šajn  
Distribution of heavy metals in soil from Prespa region
- EN 014** Ana Puteska, Bojana Dimovska, Trajče Stafilov, Robert Šajn  
Distribution of chemical elements in soil from Pelagonia region, Republic of Macedonia
- EN 015** Biljana Balabanova, Trajče Stafilov, Robert Šajn, Claudiu Tănăsela  
Elemental distribution in surface waters from Bregalnica River basin
- EN 016** Anila Neziri, Elda Marku  
Persistent organochlorine pesticide residues in water samples from buna river mouth and viluni lagoon ecosystem (Albania)



- EN 017** Violeta Jakovljević, Jelica Stojanović, Miroslav Vrvic  
The influence of commercial detergent and individual components of detergent on metabolism of *Penicillium verrucosum*
- EN 018** Anxhela Andoni, Sotir Mali, Spase Shumka  
Preliminary assessment of water quality state at the littoral zone of lake Ohrid (Albanian part)
- EN 019** Florina-Diana Dumitru, Marius-Viorel Olteanu, Mihaela Andreea Moncea, George Poteraş  
Durability of the geotextile used in the danube hydrotechnical works and its influence on the biodiversity
- EN 020** Fitim Sopjani, Tahir Arbnesi, Erzen Bajramaj, Hata Dibrani  
Environmental assessment of heavy metal pollution in the bottom sediments of Sitnica River (Kosovo)
- EN 021** Galia Gentscheva, Katerina Bačeva, Maria Dimitrova, Albena Predoeva, Krastena Nikolova, Iordanka Aleksiev, Metody Karadjov  
Trace elements content in *Sempervivum tectorum* L. from Bulgaria
- EN 022** Magdalena Trajkovska Trpevska, Stefan Jovanovski  
Investigation of dissolved organic carbon (DOC) in samples of waste sludge by using UV-vis absorption spectroscopy
- EN 023** Niko S. Radulović, Dragan Zlatković  
*n*-octyl esters of long-chain fatty acids are not anthropogenic pollution markers
- EN 024** Siniša Cukut, Saša Dunović, Nebojša Knežević  
Selection of procedure for treatment of leachate in communal waste landfill "Ramići" in Banja Luka, BiH
- EN 025** Marija Jeftimova, Trajče Stafilov, Katerina Bačeva, Robert Šajn  
Soil pollution with heavy metals in the veles region, Republic of Macedonia
- EN 026** Marijana Marković, Milica Jović, Biljana Dojcinovic, Jelena Papan, Ivan Andelković, Dalibor Stanković, Goran Roglič, Dragan Manojlović  
Degradation of NSAID by Fe(II) as catalyst
- EN 027** Ivana Mickovska, Trajče Stafilov, Katerina Bačeva, Robert Šajn  
Atmospheric deposition of heavy metals in moss samples in the Crn Drim basin region, Republic of Macedonia
- EN 028** Mihaela Andreea Moncea, Florina Diana Dumitru, Ana Maria Panait, Deák György, Alexandru Petrescu  
Numerical modeling use for the improvement of navigability conditions on the old danube river
- EN 029** Jana Simonovska, Vesna Krsteska, Željko Knez, Marija Srbinoska, Zoran Kavrakovski, Vesna Rafajlovska  
Application of hot red pepper fruit extracts for control of green peach aphid on tobacco
- EN 030** Angja Kjulumoska-Gjorgjievska, Trajče Stafilov, Katerina Bačeva, Robert Šajn  
Determination of air pollution with heavy metals in Polog region, Republic of Macedonia

- EN 031** Katerina Bačeva, Trajče Stafilev, Irina Karadjova, Dimiter Tsalev  
Attic dust samples from the vicinity of the ferro-nickel smelter plant – assessment of trace elements bioavailability
- EN 032** Suzana Veličkovski, Trajče Stafilev, Katerina Bačeva, Robert Šajn  
Moss biomonitoring of atmospheric pollution with heavy metals in Kumanovo region, Republic of Macedonia
- EN 033** Milihate Aliu, Trajče Stafilev, Robert Šajn  
Identification of soil heavy metal sources from anthropogenic activities and pollution assessment of Mitrovica region, Kosovo
- EN 034** Sonila Kane, Flora Qarri, Pranvera Lazo, Petrit Kotori  
The evaluation of water quality of vlora bay, Albania based on physico-chemical parameters and the heavy metals content

#### FUEL AND ENERGY

- FE 001** Zlatica Predojević, Biljana Škrbić, Nataša Đurišić-Mladenović  
Waste oil valorization – production of biodiesel from feedstocks with high free fatty acid contents
- FE 002** Ivana Banković-Ilić, Zoran B. Todorović, Jelena Avramović, Ana Veličković, Vlada B. Veljković  
The kinetic modeling of sunflower oil methanolysis in the presence of cosolvent in a continuous reciprocating plate reactor
- FE 003** Karmina Miteva, Gordana Bogoeva-Gaceva, Slavcho Aleksovski, Luljeta Raka  
Thermal and catalytic pyrolysis of polyolefine mixture followed by thermogravimetry
- FE 004** Yordanka Tasheva, Petko Petkov, Anton Palichev  
A novel process for obtaining of anti-knock additive
- FE 005** Yordanka Tasheva, Petko Petkov, Anton Palichev  
Effect of a new additive under bulgarian gasoline-alcoholic blends
- FE 006** Ivan Stojković, Ana Veličković, Ivana Banković-Ilić, Olivera Stamenković, Dragan Povrenović, Vlada B. Veljković  
The kinetics of lard methanolysis catalyzed by potassium hydroxide
- FE 007** Igor S. Aleksovski, Karmina Miteva, Slavcho A. Aleksovski  
Optimization of pyrolysis of biomass for the production of bio-oil
- FE 008** Igor S. Aleksovski, Karmina Miteva, Slavcho A. Aleksovski  
Pyrolysis of wheat straw in a fluidized bed reactor
- FE 009** Tatjana M. Ilievska, Jane Bogdanov, Bogdan T. Bogdanov  
New theoretical model for estimating the octane number of gasoline
- FE 010** Tatjana M. Ilievska, Jane Bogdanov, Bogdan T. Bogdanov  
Evaluation of models for calculating the octane number of gasoline

## INORGANIC CHEMISTRY AND TECHNOLOGY

- ICT 001** Aydin Tavman, Demet Gürbüz, Adem Cinarli  
Synthesis and spectral characterization of various Co(II) complexes of 1,3-bis(1*H*-benzimidazol-2-yl)-2-oxapropane
- ICT 002** Blagica Cekova, Vesna Markoska, Katerina Atkoska, Biljana Apostolova  
Characterization of natural clinoptilolite zeolite
- ICT 003** Blagica Cekova, Biljana Apostolova  
dealumination of NaY zeolite by citric acid through application of tensides
- ICT 004** Arianit A. Reka, Todor Anovski, Blagoj Pavlovski, Petre Makreski, Hamdije Memedi  
Low temperature reaction of diatomite with calcium hydroxide
- ICT 005** Hirijete Ismaili, Shefket Dehari, Muhamet Shehabi, Arianit A. Reka, Dije Dehari  
Synthesis and characterization of Cu(II) and Zn(II) complexes with schiff bases derived from salicylaldehyde
- ICT 006** Milica Jaksic, Goce Cvetkoski, Zaklina Stamboliska  
Reduction of Cr(VI) content in cement in usje cement plant

## METALLURGY

- ME 001** Z. Karastojković, R. Perić, Z. Janjušević, N. Bajić, T. Stožinić  
Main roles of indium in 14 karat gold brazing alloy
- ME 002** Rrahim Maksuti, Mursel Rama  
Vanadium and niobium content distribution across the welded joint during submerged arc welding of spiral line pipes
- ME 003** Ruzica Manojlovic, Ljupco Kostov  
Occurrence and defect causes analysis on hot-rolling mill rolls
- ME 004** Ruzica Manojlovic, Blagoj Rizov, Ratko Ilievski  
An analysis of mechanical properties of hot rolled steel sheets
- ME 005** Ruzica Manojlovic, Maja Paceskoska  
Mathematical modeling of mushy zone in function of quality of steel slabs

## MEDICAL AND PHARMACEUTICAL CHEMISTRY AND ENGINEERING

- MPCE 001** Ljiljana Stanojević, Biljana Stanković, Dušica Ilić, Vesna Nikolić, Milorad Cakić  
Antioxidant activity of aqueous extracts from dill seeds (*Anethum graveolens* L.) obtained by different recovery techniques
- MPCE 002** Dragan Cvetković, Jelena Stanojević, Ljiljana Stanojević, Dušica Ilić, Milorad Cakić  
Antioxidant activity of ethanolic extract of cultivated strawberries' leaves (*Fragariae folium*) estimated by TBA-MDA test

- MPCE 003** Ana Tačić, Dušica Ilić, Aleksandar Zdravković, Vesna Nikolić, Snežana Ilić-Stojanović, Ljubiša Nikolić, Ljiljana Stanojević, Ivan Savić  
Synthesis and characterization of anesthesin and the inclusion complex anesthesin:  $\beta$ -cyclodextrin
- MPCE 004** Ana Tačić, Snežana Ilić-Stojanović, Aleksandar Zdravković, Ljubiša Nikolić, Vesna Nikolić, Dušica Ilić, Agneš Kapor  
The potential application of the hydrogel poly(*N*-isopropylacrylamide) for modified release of aspirin
- MPCE 005** P. Breznica-Selmani, K. Mladenovska, B. Mikhova, Emil Popovski  
Synthesis of new derivatives of pipemidic acid and their structural characterization
- MPCE 006** Dragica Gorgieva, Sonja Kortosheva  
Research uniformity of dosage units of tablets
- MPCE 007** T. Petreska Ivanovska, Z. Zhivikj, L. Bogdanovska, Z. Kavakovski, L. Petrushevska-Tozi, K. Mladenovska  
Evaluation of chemical quality of probiotic/synbiotic enriched ayran
- MPCE 008** Jadranka Malina, May Labidy, Ljerka Slokar  
The effect of lactic acid on local corrosion of orthopedic stainless steel
- MPCE 009** Marijana B. Živković, Irena T. Novaković, Srđan Tufegdžić, Jovana Vilipić, Marko Jeremić, Dušan Sladić, Natalija Krstić  
Synthesis, characterization and in vitro antimicrobial activity of new steroidal thiosemicarbazones and thiadiazolines
- MPCE 010** N. N. Bui, B. Pasicka, I. Bogeski, V. Mirčeski, R. Gulaboski, M. Hoth, R. Kappl  
Cyclic hydroxylamines for detection of transient radicals and reactive oxygen species: a voltammetric and ESR approach
- MPCE 011** Jovana Vilipić, Tatjana Stanojković, Irena T. Novaković, Srđan Tufegdžić, Marko Jeremić, Marijana Živković, Natalija Krstić, Dušan Sladić  
Synthesis and biological activity investigation of ten new amino acid tert-butylquinone derivatives
- MPCE 012** Emilija Ivanova, Natalija Atanasova-Pancevska, Mitko Karadelev, Jane Bogdanov, Irina Gjorgievska, Dzoko Kungulovski  
Use of a modified microtiter plate-based bioassay method in the screening of antibacterial and antifungal activities of *Omphalotus Olearius* extracts
- MPCE 013** Darinka Gjorgieva Ackova, Katarina Smilkov, Trajče Stafilov, Sanja Kiprijanovska, Emilija Sukarova Stefanovska, Emilija Janevik-Ivanovska  
An approach for chemical evaluation of immunoconjugates of "cold" <sup>177</sup>lutetium-rituximab
- MPCE 014** Katarina Smilkov, Darinka Gjorgieva Ackova, Icko Gjorgoski, Angela Carollo, Marco Chinol, Stefano Papi, Alberto Signore, Emilija Janevik-Ivanovska  
Freeze-dried kit formulations for preparation of Lu-177 conjugated rituximab for treatment of non-hodgkin's lymphoma
- MPCE 015** Svetlana Tomic-Dukoska, Sonja Kortosheva  
Integrated model for process management in the pharmaceutical industry from TQM

- MPCE 016** Marija Spasevska, Jane Bogdanov, Hristina Babunovska  
Determination of physicochemical properties and development of a HPLC method for impurity profiling of thebaine
- MPCE 017** Irena Brashnarska, Natasha Karalija, Biljana Šapkareva, Eleonora Trajanovska, Sanja Simconovska Gusic, Suzan Memed Sejfulah, Gjorgji Petruševski, Sonja Ugarkovic  
Drug-excipient compatibility study with statin as model drug substance
- MPCE 018** Marina Chachorovska, Dejan Kostovski, Ljiljana Krsteska, Blagica Manchevska, Biljana Šapkareva, Suzan Memed Sejfulah, Sonja Maleva, Sonja Ugarkovic, Gjorgji Petruševski  
Solid-state interaction of ibuprofen with magnesium stearate – thermoanalytical myth or chemical reality?
- MPCE 019** Bosilka Stefanova, Packa Antovska, Sonja Ugarkovic, Gjorgji Petruševski, Marina Chachorovska, Filip Butikoski, Biljana Šapkareva  
Preformulation studies of BCS class II active component
- MPCE 020** Krume Toshev, Sunčica Jordanoska, Natasha A. Stojanovska, Oja Memed, Ivana Mitrevska, Marija Petrovska, Sonja Ugarkovic  
Robustness of manufacturing process for granules for oral suspension
- MPCE 021** Vasilka Dubrova-Koceva, Marina Mandzukovska, Milos Todorovski; Hristina Babunovska  
Active pharmaceutical ingredient's compatibility impact on pharmaceutical dosage form stability in order of extending the shelf life
- MPCE 022** Ana Georgieva, Elena Davitkovska, Biljana Šapkareva, Suzan Memed Sejfulah, Sunčica Jordanovska, Oja Memed, Sonja Ugarkovic  
Photo stability testing of new pharmaceutical drug product

#### MATERIALS SCIENCE AND TECHNOLOGY

- MST 001** Jaroslava Budinski-Simendić, Ayse Z. Aroguz, Jelena Milić, Natalija Budinski, Nevena Vukić, Tamara Erceg, Slobodan Prendzov  
Properties of hybrid materials based on ethylene diene terpolymer as network precursor
- MST 002** Sinem Karademir, Sibel Aydogan, Vesna Teofilović, Ayse Z. Aroguz, Jaroslava Budinski-Simendić  
Kinetic and thermodynamic studies for the adsorption of cresol red on magnetic nanobeads
- MST 003** Slobodan Glišić, Milorad Cakić, Goran Nikolić  
Synthesis and characterization of carboxymethyl dextrane stabilized silver nanoparticles in aqueous medium
- MST 004** Ljiljana Kljajević, Snežana Nenadović, Vesna Maksimović, Miljana Mirković, Jelena Gulicovski, Ljiljana Živković, Katarina Trivunac  
Characterization of metakaolin based geopolymers as adsorbents of lead ions from waste water

- MST 005** Maja Kokunešoski, Aleksandra Šaponjić, Miroslav Stanković, Jelena Majstorović  
Preparation and characterization of clay and diatomaceous earth based porous ceramics with boric acid as additive
- MST 006** Viktor Stefov, Metodija Najdoski, Gordana Bogoeva-Gaceva, Aleksandra Bužarovska  
Characterization of multi walled carbon nanotubes. Comparative study
- MST 007** Violeta Koleva, Aksu Samet, Metodija Najdoski  
Chemical bath deposition of electrochromic  $(\text{NH}_4)_0.3\text{V}_2\text{O}_5 \cdot \text{H}_2\text{O}$  thin film using diethyl sulphate
- MST 008** Sašo Stojkovikj, Violeta Koleva, Metodija Najdoski  
Electrochromic vanadium oxide thin films: from a layered to a tunnel structure
- MST 009** Aco Janevski, Gordana Bogoeva-Gaceva, Viktor Stefov, Metodija Najdoski  
Structure of Ba, Sr, Ca and Mg pimelates and their nucleating ability in polypropylene melt
- MST 010** S. Aleksovska, S. Dimitrovska-Lazova, A. Götze, M. Marinšek, H. Kohlmann, E. Hey-Hawkins  
Synthesis, structural and morphological study of  $\text{SmCo}_x\text{Cr}_{1-x}\text{O}_3$  ( $x = 0, 0.33, 0.5, 0.67$  and  $1$ ) perovskites
- MST 011** S. Dimitrovska-Lazova, M. Gjorgievska, A. Götze, H. Kohlmann, E. Hey-Hawkins, V. Mirčeski, S. Aleksovska  
Synthesis and investigation of some structural and catalytic characteristics of  $\text{PrCr}_x\text{Ni}_{1-x}\text{O}_3$  ( $x = 0.33, 0.5, 0.67$  and  $1$ ) perovskites
- MST 012** Emel Sherif, Irina Bineva, Biljana Pejova  
Structure and surface morphology of thin films composed by quantum dot solids of the ternary Cu-In-S system. A comparative AFM and XRD study
- MST 013** Dalibor Jovanovic, Radovan Karkalic, Aleksandar Nikolic, Veselin Maslak, Milorad Kuraica, Slavica Radjen  
Research and testing of novel solid-liquid phase change compounds for the body cooling application
- MST 014** Jelena Đorđević, Ana Kalijadis, Vesna Maksimović, Zoran Laušević, Tatjana Trtić-Petrović  
Characterization and application of boron doping carbonized hydrothermal carbon
- MST 015** Florina-Diana Dumitru, Ana-Maria Panait, Oscar-Fábian Higuera  
Influence of the equal channel angular pressing processing route on the mechanical behavior of ZK60 alloy
- MST 016** Ts. Lazarova, P. Tzvetkov, V. Tumbalev, S. Atanassova-Vladimirova, G. Ivanov, A. Naydenov, D. Kovacheva  
Palladium substitution in PEROVSKITE  $\text{La}_2\text{CuMnO}_6$ : structural, morphological and catalytic effects
- MST 017** Mihaela Andreea Moncea, Ana Maria Panait, Florina Diana Dumitru, George Poteraş  
Ternary binder matrices suitable for embedding of ashes with hazardous compounds content



- MST 018** Marius-Viorel Olteanu, Ecaterina Matei  
Characterization of flue gases dust from secondary aluminium production for its recovery
- MST 019** Ana-Maria Panait, Mihaela Andreea Moncea, Florina Diana Dumitru, George Poteraş  
The mechanical behavior of some binders with cathode ray tube glass waste at normal and high temperature
- MST 020** Ana-Maria Panait, Mihaela Andreea Moncea, Florina Diana Dumitru, George Poteraş  
The pozzolanic properties of paper sludge ASH and their influences on the mechanical behavior of ordinary portland cement
- MST 021** M. M. Pavlović, V. Ćosović, M. Gligorić, M. Jotanović, M. G. Pavlović  
Formation of the conductive pathways and electrical conductivity of the copper filled lignocellulose composites
- MST 022** Radovan Karkalic, Veselin Maslak, Aleksandar Nikolic, Mirjana Kostic, Dalibor Jovanovic, Zeljko Senic, Zlate Velickovic, Sonja Radakovic  
Application of permeable materials for CBRN protective equipment
- MST 023** Peter Tzvetkov, Daniela Kovacheva, Blagoy Blagoev, Nikolay Velinov  
Crystal structure and magnetic properties of perovskite-type compounds  $Pb(Ba,Sr)Fe_{2-x}(Co,Mn,Cr)_xO_5$
- MST 024** D. Bekas, D. Baltzis, D. A. Exarchos, T. E. Matikas, A. S. Paipetis  
Self-healing process monitoring via infrared thermography and acoustic emission
- MST 025** A. Katsiki, D. Gournis, A. Kouloumpis, A. S. Paipetis  
Graphitization analysis of graphene monocrystals via Raman spectroscopy
- MST 026** K. Tsirka, D. Baltzis, D. Bekas, A. S. Paipetis  
Self-healing process monitoring a via Raman spectroscopy

#### ORGANIC CHEMISTRY AND TECHNOLOGY

- OCT 001** Nahide Gulsah Deniz  
Synthesis of halogenated 1,3-butadienes containing an electron-withdrawing group and their structural studies
- OCT 002** Nahide Gulsah Deniz, Cigdem Sayil, Aysecik Sahin, Serdar Gökşin Aydınli  
Synthesis and characterization of heteroatom substituted quinones
- OCT 003** Serdar Gökşin Aydınli  
Acyclic and heterocyclic compounds from polyhalogenated nitrobutadienes
- OCT 004** Serdar Gökşin Aydınli, Aysecik Sahin, Nahide Gulsah Deniz, Cigdem Sayil  
Nucleophilic substitution reactions of quinones with N, S-substituted nucleophiles
- OCT 005** Cigdem Sayil  
Synthesis and crystal structures of butadiene compounds

- OCT 006** Cigdem Sayil, Nahide Gulsah Deniz, Serdar Gökşin Aydınli, Aysecik Sahin  
Synthesis of novel S,O-substituted quinones from the reactions of *p*-chloranil with *s*-nucleophiles
- OCT 007** Adem Çınarlı, Duygu Özata  
Synthesis of some novel benzoxazole compounds
- OCT 008** Demet Gürbüz, Adem Çınarlı, Aydın Tavman  
Synthesis and spectral characterization of 4,6-dichloro and 2-bromo-4-chloro-6-(5-chloro-1,3-benzoxazoles-2-yl) phenols
- OCT 009** Demet Gürbüz, Süleyman Tanyolaç  
Synthesis and spectral characterization of 7-[4-methoxy/(methylsulfanyl)-phenyl]-4h-[1,3,4]thiadiazolo[2,3-c][1,2,4]triazin-4-ones
- OCT 010** Aysecik Sahin, Serdar Gökşin Aydınli, Cigdem Sayil, Nahide Gulsah Deniz  
The synthesis of some novel *N*-substituted 1,4-naphthoquinone derivatives
- OCT 011** T. Dzimbova, T. Pajpanova, A. Chapkanov  
Synthesis and infrared spectral characterization of kyotorphin analogues
- OCT 012** Sevdije Govori, Shqipe Rafuna, Hamide Ibrahimli Blerta Dervisholli  
Synthesis and structural study of new 1,3,4-thiadiazole derivatives
- OCT 013** Mihai Marinescu, Dorin Bombos, Traian Juganaru, Oana Mihai, Velea Sanda, Ion Bolocan, Vasile Matei  
Hexadec-1-ene reaction on wolfram-molybdenum catalysts
- OCT 014** Menče Najdoska-Bogdanov, Jane Bogdanov, Marina Stefova  
Simultaneous determination of volatiles and fatty acids in fennel from R. Macedonia
- OCT 015** Menče Najdoska-Bogdanov, Jane Bogdanov, Marina Stefova,  
Comparison of three different extraction methods for determination of volatile secondary metabolites from fennel by gas chromatography
- OCT 016** Dijana Aleksic, Jane Bogdanov  
Isolation, physicochemical properties and chemical composition of the essential oil from caraway fruits (*Carum carvi* Linn.)
- OCT 017** Selim Elmazi, Jane Bogdanov  
A headspace gas chromatographic method for the analysis of volatile residues in some polymers
- OCT 018** Marija Popeska, Jane Bogdanov  
Preparation and reactivity of epoxides derived from some monoterpenes and phenylpropanoids
- OCT 019** Zlatko Lozanovski, Jane Bogdanov  
Synthesis of 2,4-dinitrophenylhydrazones derivatives of low molecular weight aldehydes revisited: influence of preparation method on melting points and chromatographic behaviour
- OCT 020** Zorica Petrović, Biljana Šmit, Radoslav Z. Pavlović, Zoran Marković, Dejan Milenković  
Experimental, <sup>1</sup>H nmr and computational mechanistic study of selenocyclization of alkenyl hydantoins

- OCT 021** Zorica Petrović, Dušica Simijonović, Biljana Šmit, Vladimir P. Petrović  
Synthesis and antioxidant activity of some phenolic schiff bases
- OCT 022** Tanja Dimitrova, Nataša Ristovska  
Synthesis and characterization of some *N*-acetyl-5-haloindoline-2,3-dione derivatives
- OCT 023** Tanja Dimitrova, Nataša Ristovska  
new approach for the synthesis of some *N*-alkylisatin-3-thiocarbohydrazones

#### PHYSICAL CHEMISTRY

- PC 001** Mentor Ismaili, Lauresha Këpuska, Azem Lajqi, Kaltrina Jusufi, Tahir Arbnesi  
Organic modification of Goshica (Kosovo) Clay
- PC 002** Valbonë Mehmeti, Stefan Köstler, Kurt Kalcher, Avni Berisha  
The effect of thermal sintering on sensing properties of the inkjet printed surfaces
- PC 003** Dragan Z. Troter, Zoran B. Todorović, Dušica R. Đokić-Stojanović, Vlada B. Veljković  
Effect of temperature on the physico-chemical properties of two choline chloride-based deep eutectic solvents
- PC 004** Mentor Ismaili, Makfire Sadiku, Lauresha Këpuska, Njomza Lajqi, Altin Mele, Valbonë Mehmeti  
Physicochemical characterization of the natural and organic modified clay from Kosovo
- PC 005** Nadezhda Markova, Venelin Enchev, Ljupco Pejov  
A hybrid statistical mechanics – quantum mechanical model for proton transfer in 5- and 6-azauracils in water solution

#### POLYMERS

- PS 001** G. Siljanovska Petreska, J. Blazevska-Gilev, R. Tomovska  
Environmentally friendly method of polymer and composite foams preparation: high shear processing of polymer latex
- PS 002** Aleksandra Miletić, Ivan Ristić, Jelena Tanasić, Branka Pilić  
The influence of nanosilica on the pla films properties
- PS 003** Aleksandra Ivanoska-Dacikj, Gordana Bogoeva-Gaceva, Aleksandra Bužarovska  
Natural rubber/organo-montmorillonite nanocomposites: dynamic mechanical properties
- PS 004** Luljeta Raka, Gordana Bogoeva-Gaceva, A. Sorrentino  
Dynamic-mechanical properties of polypropylene/layered silicate nanocomposites
- PS 005** G. Siljanovska Petreska, D. Spasevska, R. Tomovska, M. Marinkovski, J. Blazevska-Gilev  
Properties comparison of polymer/reduced graphene oxide composites and their ir laser ablation deposits

- PS 006** D. Spasevska, R. Tomovska, M. Marinkovski, J. Blazevska-Gilev  
Synthesis of polymer/reduced graphene oxide nanocomposites via in situ emulsion polymerization technique

#### SPECTROSCOPY AND STRUCTURAL CHEMISTRY

- SSC 001** Slobodan Glišić, Milorad Cakić, Goran Nikolić  
Spectroscopic study of complexation of various bivalent metal ions with carboxymethyl dextrane
- SSC 002** Ondrej Milkovič, Karel Saksl, Ľubomír Pikna  
Characterization of Pd nanoparticles structure deposited on carbon-based supports
- SSC 003** Aleksandar Markozanov, Igor Kuzmanovski, Biljana Minčeva-Šukarova  
Chemometric analysis of different types of INK based on their infrared spectra
- SSC 004** A. Dimitrova, E. Prokopova, A. Jashari, B. Stamboliyska, B. Mikhova, K. Mladenovska, E. Popovski, D. Batovska  
Structure and antioxidant activity of isoxazolo- and thiazolohydrazinylidene-chroman-2, 4-diones
- SSC 005** B. Stamboliyska, Z. Glavcheva, S. Neykova  
Analytical studies of ceramic lids from the chalcolithic archaeological site of Deneva Mogila, Bulgaria
- SSC 006** Zuldjevat Abdija, Metodija Najdoski, Violeta Koleva, Tomče Runčevski, Robert E. Dinnebier, Bojan Šoptrajanov, Viktor Stefov  
Infrared and Raman spectra of magnesium ammonium phosphate hexahydrate (struvite) and its isomorphous analogues. X. Preparation, structural, thermal and spectroscopic studies of magnesium potassium arsenate hexahydrate
- SSC 007** Violeta Koleva, Viktor Stefov  
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- SSC 008** Denitsa Yancheva, Evelina Velcheva, Simcon Stoyanov, Olga Govedarica, Snežana Sinadinović-Fišer  
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- SSC 009** Denitsa Yancheva, Evelina Velcheva, Bistra Stamboliyska  
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- TX 010** Tatjana Sarac, Jovan Stepanovic, Goran Demboski, Dusan Trajkovic, Natasa Radmanovac  
Analysis of the relation between structure and draping parameters of cotton polyester blended fabrics

MST 009

**STRUCTURE OF Ba, Sr, Ca AND Mg PIMELATES AND THEIR  
NUCLEATING ABILITY IN POLYPROPYLENE MELT**Aco Janevski<sup>1</sup>, Gordana Bogoeva-Gaceva<sup>2</sup>, Viktor Stefov<sup>3</sup>, Metodija Najdoski<sup>3</sup>

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The pimelates of the earth-alkaline elements and pimelic acid have been synthesized and studied. All prepared pimelates are crystallohydrates and Ba and Sr pimelate are isomorphous. The obtained compounds have been characterized using FTIR and Raman spectroscopy and X-ray diffraction and it was found that, at the melt temperature of polypropylene, the pimelates of Ba and Sr are crystalline whereas the ones of Ca and Mg are amorphous.

The nucleation activity of these pimelates have been studied in the process of crystallization of polypropylene in non-isothermal conditions and followed by differential scanning calorimetry (at rate of crystallization  $V_c = 1-20$  K/min). It was found that their nucleation activity, even at concentration of 0.1 %, differs considerably with regards to the crystallization rate, and they induce different polymorphic composition of the polymer. The nucleation activity was mostly exhibited by Ca pimelate, and when it was used the content of the  $\beta$  crystalline phase ( $U_\beta$ ) in polypropylene ranged from 0.90 to 0.94, depending on the crystallization rate, compared to 0.18-0.35 when Mg pimelate was used. In the polymer obtained by using Ba and Sr pimelate,  $U_\beta$  ranged from 0.47 to 0.77. Based on the structures of the pimelates and the theoretical concepts for nucleation activity of solid substrates, an attempt was made to correlate the obtained activity to the structural parameters of the obtained polymer.

**Keywords:** polypropylene, polymorphism,  $\beta$ -nucleators, pimelates



# STRUCTURE OF Ba, Sr, Ca AND Mg PIMELATES AND THEIR NUCLEATING ABILITY IN POLYPROPYLENE MELT

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## Introduction

The mechanism of heterogeneous nucleation in the crystallization of polyolefines has been discussed in several, sometimes controversial, ways. The nucleation mechanism for the formation of  $\beta$ -phase in PP by nucleating agents has not been clarified well yet. Lotz et al. [1] proposed the "dimensional lattice matching theory", which has been widely accepted for some  $\beta$ -nucleating agents for PP. In this theory, the  $\beta$ -nucleation capability was assumed as a result of structural relationship between nucleating agent and  $\beta$ -phase of PP. A lattice matching between c-axis periodicity of PP (0.65 nm) and a corresponding distance in the substrate crystal face of nucleating agent is assumed the main reason for inducing the  $\beta$ -phase polymorph in PP. If the nucleating agent has the feature size of 0.65 nm and applies the surface contact in specific geometrical type with PP, it could induce the  $\beta$ -phase in PP.

## Objective

The aim of this work is to analyze the structural characteristics of Ba, Sr, Ca and Mg pimelates and to correlate with their nucleation ability.

## Experimental and materials

Pimelic acid and carbonates of magnesium, calcium, strontium and barium were commercially available. Magnesium, calcium, strontium, and barium salts of pimelic acid were synthesized by reaction of 50 % (m/m) of pimelic acid and carbonates of magnesium, calcium, strontium and barium (Merck).  $\beta$ -nucleated iPP was obtained by mixing 0.1 %wt. pimelates with iPP in Brabender PL 2000 at 460 K. The nonisothermal crystallizations of nucleated iPP was analyzed by DSC. The sample was rapidly heated to 478 K and held in the molten state for 5 min, to erase the thermal history of the polymer, then the sample was cooled at different cooling rates: 1, 3, 5, 10, 15, and 20 K/min.

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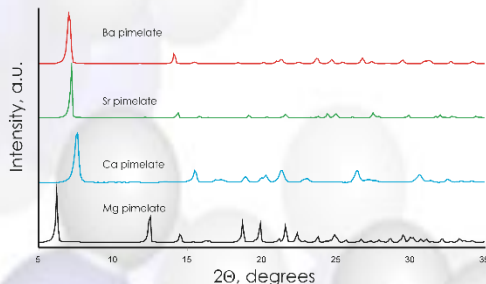


Figure1 . X-ray diffraction pattern of pimelates.

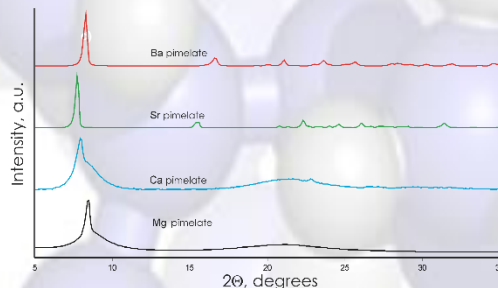


Figure 3. X-ray diffraction patterns of dried pimelates.

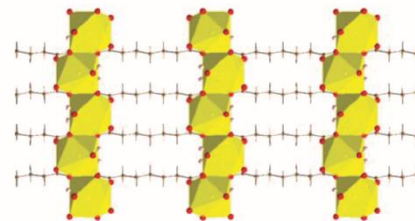


Figure2. Diamond image of barium and strontium pimelate monohydrate [3], view of packing along c axis [2, 3].

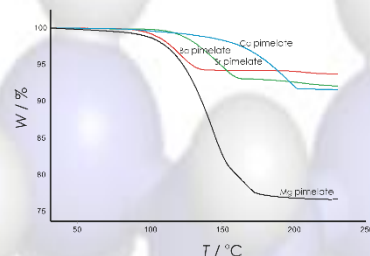


Figure 4. TGA of pimelates.

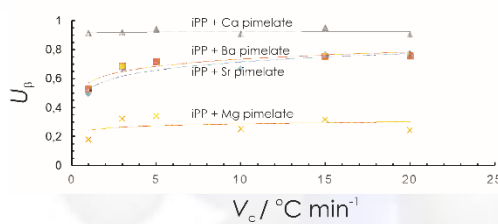


Figure 5. Dependence of the relative content of  $\beta$ -phase ( $U_\beta$ ) of nucleated iPP with pimelates on cooling rate ( $V_c$ ).

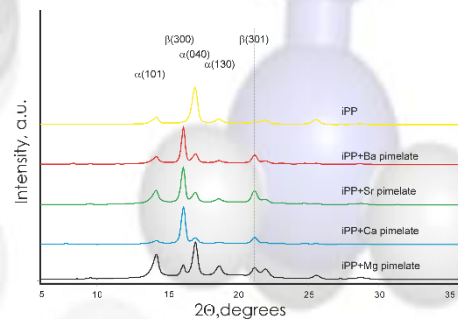


Figure 6. X-ray diffraction patterns of iPP and nucleated iPP.

## Conclusions

All of the prepared pimelates are crystallohydrates, and Ba and Sr pimelate are isomorphous. It was found that, at the melt temperature of polypropylene, the pimelates of Ba and Sr are crystalline, whereas the ones of Ca and Mg are amorphous. Close to the manufacturing iPP temperatures (around 473 K), pimelates lose water and their structure is changed. The nucleation activity was mostly exhibited by Ca pimelate, and when it was used, the content of  $\beta$  crystalline phase ( $U_\beta$ ) in polypropylene ranged from 0.90 to 0.94, depending on the crystallization rate, compared to 0.18–0.35 when Mg pimelate was used.



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## **CERTIFICATE OF ATTENDANCE**

Hereby we certify that the poster presentation titled:

**STRUCTURE OF Ba, Sr, Ca AND Mg PIMELATES AND THEIR NUCLEATING ABILITY IN  
POLYPROPYLENE MELT**

by Aco Janevski, Gordana Bogoeva Gaceva, Viktor Stefov, Metodija Najdoski

has been presented at the 23<sup>rd</sup> Congress of Chemists and Technologists of Macedonia with  
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Prof. Dr. Ljupčo Pejov

Prof. Dr. Jane Bogdanov

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